

Colorado Department of Health
Comments on Technical Memorandum
Revision 0 3/31/94
Revised Field Sampling Plan, OU 11

General Comments

1) Surficial Soils: The justifications for reducing the number of necessary samples are not well presented. The only acceptable reason lies in the number of samples necessary to make a robust statistical comparison of site data to background. Historical sampling results and dismissal of hot spots without supporting evidence are not defensible reasons to change a sampling plan.

The discussion of null hypothesis testing on page 2-9 is backwards. Per the "Guidance for Planning for Data Collection in Support of Environmental Decision Making Using the Data Quality Objectives Process" (EPA 1993), the null hypothesis must be set to the true state of nature for the more severe decision error. The more severe decision error occurs when data leads the decision maker to believe that the site is clean when it is not; the true state of nature in this case, and therefore the null hypothesis, must be that the site is contaminated. This makes the Type I error, falsely rejecting H_0 (deciding the site is clean when it is dirty), the more severe decision error that must be closely controlled.

Appendix E, the statistical justification, is difficult to follow. A great deal of discussion is given to Type I error rates, mean shifts, power, and coefficients of variation. The text suggests guarding against excessive Type I error rates by setting this value at 0.05, but the way the null hypothesis is set up, this guards only against what the text refers to as "false alarms". In this context, the FSP is more concerned about a "false alarm" than protecting against the REAL risk of not taking action when action is warranted. This is not acceptable.

A sample size of about 30 then appears on page E-5, but the preceding text leading up to it is confusing and difficult to understand for those not statistically versed.

While not disagreeing with the conclusions, the Division feels the justification must be better presented. If the proposal is accepted, what is the resulting power and mean shift detection capability? What is a typical CV value for environmental data? *What are the bottom-line ramifications in changing from 75 to 34 samples?* These types of conclusions are lost in the statistical maze and need to be clarified.

We also request another 4 or 5 samples located within spray areas 1 and 2 to investigate the possibility of leakage (and therefore higher localized concentrations). Candidate locations would include intersections of major pipelines or directly underneath sprinkler heads. These would be the only areas where any type of "hot spot" may exist.

2) Subsurface Soils: Are 120 samples necessary when 34 suffice for surficial soils? Two foot composites to a depth of 30 feet seems excessive, especially when only the upper five to ten feet are of particular interest. It may be more cost effective to concentrate on the upper ten feet, and reduce the sampling frequency below that. The only exception to this rule will be when a clay layer is found in the borehole, in which case the clay must be sampled discretely.

3) Groundwater: The logic involved in the placement of new wells isn't sound. The text makes a big point of locating perched groundwater mounds, but the proposal is strictly a hit-or-miss approach. Only proposed well 94WSF-4 is anywhere close to existing wells that have shown shallow groundwater and high nitrates (0582/0682/46292), and even then it is on the other side of the road. Will the grading of that road affect the subsurface enough to impact this new well?

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Page 4-9 states "the objective of well installation is to monitor groundwater quality in potentially contaminated perched mounds". However, the approach of drilling boreholes looking for perched groundwater, but abandoning them if nothing is found, makes it very possible that this objective will not be met. If this is truly a primary objective of the FSP, more thought and effort needs to be given to locating the perched mounds because they are likely to be missed. The DQOs label this as a "media of primary concern". This apparent inconsistency must be resolved prior to implementation of the groundwater field work.

If a borehole is advanced to the saturated zone without encountering a perched groundwater mound, the Division requires that the well be completed and groundwater be sampled for at least 4 quarters (depending on the concentration of analytes). Existing coverage within the spray areas themselves is sparse.

Specific Comments

- 1) Executive Summary, page ES-1: Historical data has NOT been subjected to a "rigorous statistical review". Appendix C presents available data but only compares site means/maximums with background means. A rigorous review, like that of the approved Gilbert methodology, will still be required for OU11.
- 2) Executive Summary, page ES-4: This organizational chart adds nothing to the TM. Does it need to be there?
- 3) Section 2.1, Step 1, page 2-3: Conflicting statements exist over the "primary media of concern". Page 2-2 says it is the groundwater in the UHU; this page says it is surficial and shallow soils. Given that the data obtained during the historical sampling for surficial/shallow soils has not been validated, it must be clarified that BOTH media are of concern and will be adequately investigated.
- 4) Section 2.1, Step 1, page 2-3, hydrologic conceptual model: The primary goal of the FSP is to gather data, NOT to evaluate potential risk. The proper "goal of the FSP" wording is at the top of page ES-2.
- 5) Section 2.1, Step 5, page 2-9: It is unclear what the first sentence under the "action levels" heading means. What does the $\pm 20\%$ apply to? Discussions in earlier sections correctly delineate the action levels as driven by background, ARARs, and risk.
- 6) Section 2.1, Step 6, page 2-9: Refer the reader to Appendix E for the quantitative discussion of the statistical limits.
- 7) Section 3.3: There are three problems associated with the discussion:
 - i) The 1988 test pit data is not validated; however, this data is being used in the development of the FSP.
 - ii) The background data set used is from Rock Creek. The Division has previously expressed its concerns on the use of Rock Creek data, particularly for radionuclides. The Division will not allow its use to be extended to OU11 for comparisons of plutonium and americium to background.
 - iii) The depth intervals used in the site-to-background discussion are not comparable. This ABSOLUTELY MUST be avoided in the RFI/RI report.

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It must be explicitly stated that (at least) these limitations exist, and that the approach to the revised FSP is not wholly predicated on the interpretation of these historical results.

8) Section 3.5: Provide the well number from which VOCs were detected and radionuclides were elevated above background.

9) Figure 3-4: In addition to the uR/hr exposure values, provide equivalent pCi/g values for the radioisotopes of interest. The format may be graphical or tabular (similar to the recent Industrial Area HPGe data presentation).

10) Section 4.6, page 4-14: Why were nitrates omitted from the subsurface soils analytical requirements? Nitrates are listed as analyte priority 1 on page 4-15.